



Bibliometric Evolution

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BRIEF COMMUNICATION

Bibliometric Evolution: Is the *Journal of the Association for Information Science and Technology* Transforming Into a Specialty Journal?

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Applying a recently developed method for measuring the level of specialization over time for a selection of library and information science (LIS)-core journals seems to reveal that *Journal of the Association for Information Science and Technology (JASIST)* is slowly transforming into a specialty journal. The transformation seems to originate from a growing interest in bibliometric topics. This is evident from a longitudinal study (1990–2012) of the bibliometric coupling strength between *Scientometrics* and other LIS-core journals (including *JASIST*). The cause of this gradual transformation is discussed, and possible explanations are analyzed.

At the Eighth International Conference on Conceptions of Library and Information Science (CoLIS 8) in Copenhagen (August 19–22, 2013), we presented a paper (Nicolaisen & Frandsen, 2013) describing and testing a new method for measuring the specialization of scientific journals over time. The method was tested on a selection of library and information science (LIS) journals taken from the list of core journals found in the seminal paper by White and McCain (1998). With one important exception (which is the issue of this brief communication and to which we shall return in a moment), the new method was found to distinguish satisfactorily between general journals and specialty journals and, moreover, was found to effectively measure the level of specialization among the selected journals. Table 1 lists the

journals included in the study. Figure 1 shows the results (with permission from the CoLIS 8 proceedings chair).

The level of specialization over time is measured by calculating the overlap in bibliographic references year by year. For example, a journal produces 2,600 references in year 0 and 2,000 references in year 1; 2,800 of these are unique, and 800 are found in the reference lists of the journal in both years 0 and 1. Thus, 400 of 2,000 references in year 1 are similar to references found in the same journal in year 0. This equals 20%, and is taken as an indicator of the level of specialization in that journal in year 1. The level of specialization in year 2 is calculated by comparing the overlap in bibliographic references used by the journal in year 1 and year 2, and so on. This method for measuring scientific consensus and specialization is a refinement of methods developed by Price (1970); Cole, Cole, and Dietrich (1978); Cole (1983); and Nicolaisen and Frandsen (2012).

Figure 1 shows the result of our analysis of the re-citation share of 364,747 references in 11 journals from 1991 to 2012. Only articles, notes, reviews, and letters were included in the study. *JASIST* and *Scientometrics* stand out because they seem to be characterized by a greater extent of specialization throughout the entire period. *Information Processing & Management* scores slightly lower during the first 15 years, but its share of re-citations drops remarkably during the last 5 years.

Being most familiar with the information science journals, we expected to find a clear divide in the degree of specialization between the general information science journals and the specialized ones. The general information science journals seek to cover the discipline as a whole

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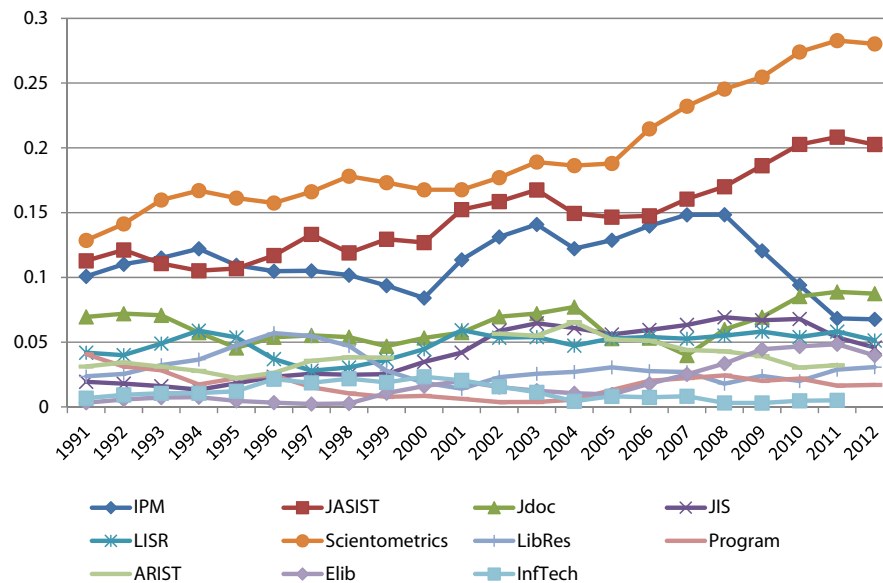


FIG. 1. Level of specialization (1991–2012). *IPM* (Information Processing & Management); *LISR* (Library & Information Science Research); *ARIST* (Annual Review of Information Science and Technology); *JASIST* (Journal of the Association for Information Science and Technology); *Scientometrics*; *Elib* (Electronic Library); *Jdoc* (Journal of Documentation); *LibRes* (Library & Information Science Research); *InfTech* (Information Technology and Libraries); *JIS* (Journal of Information Science); *Program* (Program—Automated Library and Information Systems). [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

TABLE 1. Journals included in the study.

Library and information science journals	
Information science	
<i>Annual Review of Information Science and Technology</i>	
<i>Information Processing & Management</i> (and <i>Information Storage & Retrieval</i>)	
<i>Journal of the Association for Information Science</i> (and <i>Journal of the Association for Information Science and Technology</i>)	
<i>Journal of Documentation</i>	
<i>Journal of Information Science</i>	
<i>Library & Information Science Research</i> (and <i>Library Research</i>)	
<i>Scientometrics</i>	
Library automation	
<i>Electronic Library</i>	
<i>Information Technology and Libraries</i> (and <i>Journal of Library Automation</i>)	
<i>Library Resources & Technical Services</i>	
<i>Program—Automated Library and Information Systems</i>	

whereas journals such as *Scientometrics* and *Information Processing & Management* focus on the research and development in two subfields. Thus, we expected to find high degrees of specialization in these two journals over time and lower degrees of specialization in the rest. With the exception of *JASIST*, our expectations came true. Being a general information science journal, *JASIST* fits poorly with the idea that general journals re-cite much less than do specialized journals. Does that mean that our operationalization and new measure of scientific specialization over time is flawed, or could it be that *JASIST* has gradually shifted its main focus?

In our CoLIS paper (Nicolaisen & Frandsen, 2013), we argue that the high degree of re-citations found in *JASIST* may be caused in part by the relatively high number of articles on bibliometric topics published by *JASIST*. It could be that *JASIST* to some extent acts as host for a highly specialized subfield. In support of this idea, we referred to a study by Schneider (2009), who had analyzed references and citations between the same sample of journals that we study. He found that next to self-citations from *Scientometrics* to *Scientometrics*, *JASIST* is the only other large contributor of citations to *Scientometrics* (Schneider, 2009). This lends some support to the bibliometric host idea, but to investigate the idea further, we promised to do a follow-up study in which we would compare the bibliographic coupling strength of *Scientometrics* and the rest of the journals in our sample. If *JASIST* proves to have a much higher degree of bibliographic couplings with *Scientometrics* compared to the other LIS journals, it could explain (at least in part) its high scores in Figure 1.

Method

To test the bibliometric host idea, we have compared year by year the strength of bibliographic coupling between *Scientometrics* and all other journals in our sample (1990–2012). A bibliographic coupling is defined as a 100% match between a reference in *Scientometrics* in a specific year and a reference in another journal the same year. Consequently, spelling errors, typing errors, variations of spelling, and the like should be considered a possible source of bias; however, as these irregularities are expected to be evenly distributed

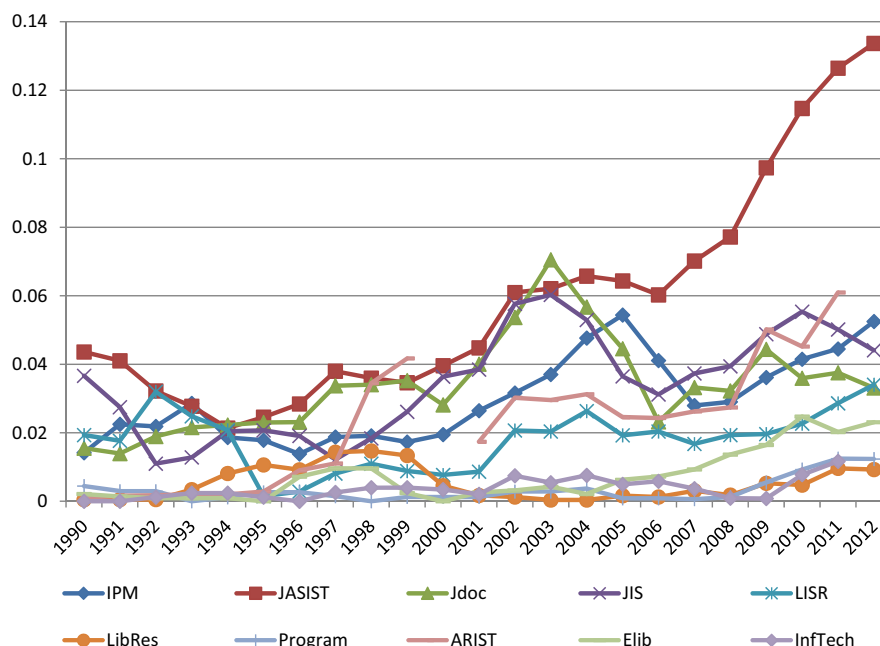


FIG. 2. The strength of bibliographic coupling: *Scientometrics* and other journals (1990–2012). *IPM* (Information Processing & Management); *LISR* (Library & Information Science Research); *ARIST* (Annual Review of Information Science and Technology); *JASIST* (Journal of the Association for Information Science and Technology); *Elib* (Electronic Library); *Jdoc* (Journal of Documentation); *LibRes* (Library & Information Science Research); *InfTech* (Information Technology and Libraries); *JIS* (Journal of Information Science); *Program* (Program—Automated Library and Information Systems). [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

across the data set, bias is unlikely. Data registered are name of journal, publication year, cited references in the journal, and the number of instances for every reference. Some of the references appear more than once; consequently, the number of bibliographic couplings depends on the total number of instances and not just the number of unique references. The bibliographic coupling strength between two journals in this case is calculated between two identical publication years. The bibliographic coupling strength between the publications in a given year (y) in a journal (j) and the publications in another journal (s) in the same publication year (y) is calculated as follows:

Strength of bibliographic coupling = $\frac{\text{number shared references}_{j,y,s,y}}{\text{total number of references}_{j,y}}$

The *Journal of Information Science* can serve as an example. In 2010, the *Journal of Information Science* contained 2,279 references, of which 106 were citations appearing in *Scientometrics* the same year, resulting in a share of re-citations of $106/2,279 = 0.055$.

Results

As can be seen in Figure 1, the degree of re-citations in *Scientometrics* varies from 0.13 to 0.28 and is thus considerably higher than the degrees shown in Figure 2. A high level of self-dependency is to be expected. During the last decade, *JASIST* is by far the journal showing the strongest bibliographic coupling strength with *Scientometrics*. The

four library automation journals are exhibiting a very weak bibliographic coupling strength with *Scientometrics*, although there may be a tendency during the last few years toward a slight increase. The increase is, however, too small to be considered statistically significant at the .05 level.

Discussion

These results support the earlier findings by Schneider (2009). They indicate that it is not our measure of specialization that is flawed but that *JASIST* over time has shifted its focus more toward bibliometrics, thus becoming gradually more and more specialized. The cause of this transformation would be interesting to investigate further. Is it mainly caused by editorial self-preferences or is it a symptom of something deeper going on in our discipline?

The editor, Blaise Cronin, is a highly respected bibliometrician, widely recognized for his many important contributions to bibliometrics, and winner of the prestigious Derek de Solla Price Medal. It is thus quite natural to suspect that his interest in bibliometrics is what has caused the gradual transformation. However, Cronin took over the editorship of *JASIST* on January 1, 2009. As seen in Figures 1 and 2, the gradual transformation started years before that date.

Perhaps the transformation is caused by a change in what might be termed “practical interests.” In his famous dissertation, Merton (1938/1970) showed how the problems that 17th-century British scientists chose to work on were

influenced by a series of economic and military concerns confronting their society.

The core domains of LIS have traditionally been: bibliometrics, information seeking and retrieval (IS&R), knowledge organization (KO), and information retrieval (IR) systems design. Within each of these domains, information scientists have worked for decades on developing new theories and methods for improving our understanding of various information phenomena and for achieving better utilization of different types of information systems. Information scientists still do! Yet, as described by Hjørland (2012), the Google era has, to some extent, reintroduced the idea of a quick “technological fix”—that many of the old research problems that have traditionally occupied information scientists may be solved easily by new technology. The domain of KO is, for instance, challenged at the practical level by libraries ceasing to classify their own books. Hjørland (2012) gives examples from Denmark where at least two major libraries have ceased classifying their own collections. Instead, they are relying on classifications from external sources and on user tagging. He noted that:

Many library directors expect that, in the future, large scanning projects (such as that which is being conducted by Google) may enable full text searches to be carried out of all available content. For this reason, they may consider it a waste of resources to classify or index books. (p. 300)

Thus, if Hjørland is right, traditional LIS domains such as IS&R, KO, and IR systems design are challenged at the practical level. Of course, this also may affect the research level of LIS where researchers also work on solving practical problems. The bibliometric domain is not challenged in the same way as are the three other traditional LIS domains. On the contrary, in recent years, a massive interest in the practical aspects of bibliometrics for research evaluation has emerged. A number of countries (including Denmark) have developed national university rankings based on various bibliometric indicators. Because the problems that 17th-century British scientists chose to work on were influenced by a series of economic and military concerns confronting their society, practical interest in bibliometrics also may have affected the foci of attention in LIS, and thus may be part of the explanation for the bibliometric transformation of

JASIST. The problem with that explanation is, of course, that this transformation is seemingly only affecting *JASIST*. Why are the other LIS journals not “going bibliometric?”

Other explanations also may be worth pursuing. Migration of topics might be a place to start. It is quite obvious that a topic such as IR, which was previously a core information science topic, has now more or less migrated to the computer science field.

Our initial idea was just to develop a new method for measuring the process of specialization over time. We discovered a possible flaw in the method when we applied it to a selection of LIS journals. Initially, this bothered us, but after having looked deeper into it, we conclude that it is not the method that is flawed. Moreover, we believe to have discovered an interesting paradox, perhaps worth pursuing further.

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